

AIR WAR COLLEGE

AIR UNIVERSITY

PEO LIFE CYCLE COST ACCOUNTABILITY: VIABILITY OF
FOREIGN SUPPLIERS FOR WEAPON SYSTEM DEVELOPMENT

By

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Biography

Air Force civilian Floretta Moore, DR-IV is assigned to the Air War College, Air University, Maxwell AFB, AL. Ms. Moore has more than 28 years engineering experience in acquisition development, developmental test and operational test. Previous positions held during her career have been AFRL Deputy Capability Lead for Special Operations and Personnel Recovery core function technologies; Chief Production Engineer, Miniature Air Launched Decoy Program; Systems Engineering Capability Delivery Lead responsible for Missile Defense Capability Delivery-03. Systems Engineering Chair of the Joint Scenario Working Group (JSWG); Oversight Executive/Weapon System Portfolio Lead in the Deputy Undersecretary of Defense, Advanced Systems Concepts; F-15 Chief Flight Test Program Management Engineer, 40 FLTS managing technical direction of F-15, A-10 and F-16 conducted at Eglin AFB, FL; Joint Air to Surface Standoff Missile (JASSM) Joint Program Office (JPO), ACAT 1 Joint Program Office M&S IPT Lead Engineer; HQ Air Force Test and Evaluation Weapon System Portfolio lead; Chief Test Engineer/Operations Research Analyst for Advanced Programs 53rd Wing advanced programs tests; 46 OG/OGMT, Lead Analyst prior to down select of Joint Direct Attack Munition; Lead Analyst, Air Force Seek Eagle Office for Aircraft/Weapon Safe Escape/Safe Separation.

Ms. Moore is Level III Certified in PM, T&E and SPRDE.

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Abstract

In recent history, the United States of America has developed vulnerabilities to our national security by becoming more reliant on foreign suppliers for acquisition and development of Air Force weapon systems. These vulnerabilities are due to growing reliance on foreign suppliers for raw materials to include various elements, metals, industrial minerals and agricultural products needed to supply the industrial base that provides products to meet military and civilian needs. These raw materials are not found or produced in sufficient quantities in the United States to meet our national security needs. The U.S. also is faced with vulnerabilities in reliance on foreign producers and manufactures due to lack of indigenous production capabilities in country. Defense production and manufacturing companies will not develop and produce items at a loss. Over the years pricing, mergers and consolidations within our industrial base have contributed to the issues and vulnerabilities associated with our reliance on foreign suppliers and producers.

This paper exposes areas of dependence and vulnerabilities associated with the United States dependence on foreign suppliers for raw materials and production items for U.S. Weapon systems. This paper uses a qualitative approach to identify vulnerabilities and mitigate or find solutions associated with our dependence on these suppliers.

Introduction

Most American's appreciate the importance of maintaining our national security but there are complicated challenges we face in doing this. In the past, the U.S. has had the reputation of being able to sustain air and space superiority for decades but can we hold this reputation? We are now faced with global terrorism and we can no longer rest on our laurels believing in the advantage of hegemon and friendly neighbors. We are now facing a plethora of threats from multiple arenas to include countries and rogue groups that can project power across borders and over long distances using asymmetric weapons and tactics.

One of the most critical tools in our arsenal to maintain our national security and dominance through sustaining military and air superiority has been America's ability to develop and maintain critical cutting edge technologies and tools for our warfighters and their support systems. Grant Gross the author of "Study: U.S. military too reliant on foreign-made equipment" said that "The U.S. military's reliance on foreign-made products, including telecommunications equipment and semiconductors, is putting the nation's security at risk by exposing agencies to faulty parts and to the possibility that producing nations will stop selling vital items."¹

In 2013, Frank Kendell, the Under Secretary of Defense for Acquisition, Technology and Logistics spoke before the Committee on Banking, Housing and Urban Affairs and in part of his address he said that we are faced with issues relative to globalization. He indicated that through globalization we have restructured our industrial base increasing our dependence on multinational defense companies.² This adds to the U.S. national security risks associated with our dependence on foreign industry providing raw materials and products.

In 2003 Secretary of the Air Force, James G. Roche, speaking to the National Security

Forum, at Maxwell AFB, addressed the challenges we face in sustaining our dominance in this arena. He addressed the importance of delivering superior combat capability tools for now and in the future, but he indicated that he has real concerns about this. Mr. Roche stated that he was concerned about our ability to do better in delivering superior combat capability to our men and women. He argued that the advantage lies with the nation or rogue group that figures out how to use innovation and technology to best advance their cause. He said that “innovation and technology belong to those who act.”³

The U.S. defense industry’s dependence on foreign suppliers for materials and manufacturing is an ongoing concern in our ability to provide quality tools and capabilities to our warfighter. Mr. Roche said that we as a nation fail to appreciate that industry will not build things at a loss which is in part driving some of our dependence on foreign suppliers for material and components in U.S. Military weapon system development.⁴

The situation this country faces is that our national security could potentially be at risk because we need strategic natural resources that could be controlled by our potential adversaries in the future. The natural resources risks we face are that our nation’s production capability does not reside within the United States and company mergers or acquisitions within our industrial base have driven an increase in U.S. reliance on foreign producers. This paper exposes these sources of U.S. security vulnerabilities and mitigation strategies or programs that the U.S. Defense Department can use to leverage commercially available emerging technologies while ensuring lifecycle security and availability.

Reliance on foreign suppliers for acquisition and development of military weapon systems places our country in a vulnerable position relative to national security. The growing dependence on foreign suppliers and producers creates risk to the U.S. Military’s supply chain

and must be addressed to enhance national security. The U.S. Military must develop strategies to leverage commercially available technologies or programs to ensure life cycle security and material availability for our U.S. Military weapon systems. Given the U.S. Military dependence on foreign suppliers for weapon system development, ultimately the U.S. Military must develop strategies to leverage commercially available technologies or programs to ensure life cycle security and material availability for our U.S. Military weapon systems.

Vulnerabilities

The U.S. buys a large quantity of goods from foreign countries to include China, African countries, Canada, Mexico, Japan, Germany, South Korea and others. The overarching categories of items the U.S. purchases from these countries are clothing and textiles, electronics, home and office supplies and equipment, raw materials and other miscellaneous products. Not all of these products are identified as strategic or needed for use in national defense. The U.S. reliance on many foreign suppliers for acquisition and development of military weapon systems places our country in a vulnerable position relative to national security. Key contributing factors are the rapid rate of technology development coupled with the current long term military and national securities activities, strategic and critical materials are not readily available or produced in adequate quantities to supply the warfighter.

One of the problems this country faces is that our national security is potentially at risk because we have a growing need of strategic natural resources that could be controlled by our adversaries in the future. Another problem is the U.S. lacks indigenous production capability and company mergers or acquisitions have driven U.S. reliance on foreign producers.

Raw Materials

The U.S. relies on other countries throughout the world for various elements, metals, industrial minerals and agricultural products. Collectively these products are commonly known as Strategic Minerals. These are minerals that the U.S. defense department requires to supply the military, industrial, and essential civilian needs for the warfighter or use during a national emergency. This category includes any material not found or produced in the United States in sufficient quantities to fill any shortages of materials that are driven by strategies that accelerate operational timelines, therefore accelerating or amplifying a material need to meet national security needs.

China and its near monopoly on production of rare earth elements illustrates some of the potential adverse implications to U.S. national security. Research provided by Dr. Derek Scissors published by the Heritage Foundation indicated that the dollar amount is not the vulnerability but that “rare earths are crucial for production of core defense equipment, and China is the leading global producer and it’s trying to restrict its’ supply.”⁵

Valerie Biley Grasso in her *Rare Earth Elements in National Defense* report indicated that China now produces “nearly 97% of the global supply of rare earth elements.”⁶ This percentage of supply appears to render the U.S. completely dependent on China for these rare earth elements.

Similarly, in 2012, Lt. Col Charles J. Butler submitted a research report to Air Force Fellows describing these elements and the implications of China’s monopoly on the U.S. national security. The importance of these elements is that they are used in the manufacturing of both commercial and military products. Precision guided munitions, engine coatings for fighter aircraft, shipbuilding and smartphone components are a few examples of the use of rare earth

elements in defense weapons systems. Lt. Col Butler argued that this dependency on any country as a near sole provider for these elements is foolhardy when considering the framework of a China vs. U.S. scenario.⁷

In addition to China's near monopoly on production of rare earth elements, Africa is ranked first or second, relative to the mineral, in their mineral reserve. This reserve is comprised of "(20% to 89%) of world mineral reserves of bauxite, chromite, cobalt, diamond, gold, manganese, phosphate rock, platinum-group metals (PGM), titanium minerals (rutile and ilmenite), vanadium, vermiculite, and zirconium."⁸

Again, the U.S. has both commercial and national defense product dependency on these minerals, and more must be done to mitigate the national security risks associated with American dependency on foreign suppliers for rare earth elements.

Production Capability

In addition to the U.S. risk associated with dependence on foreign suppliers for strategic raw materials, our national security is at risk due to reliance on foreign producers. This risk has been growing because we have little or no strategic production capability within the United States. In a May 2013 article in PC World, Grant Gross noted "the U.S. military's reliance on foreign-made products including telecommunications equipment and semiconductors, is putting the nation's security at risk by exposing agencies to faulty parts and to the possibility that producing nations will stop selling vital items,"⁹ Mr. Gross indicated it doesn't make sense that we are seeing growing cyber threats from Asia and we are getting critical defense products from these same countries.

Some of the critical components are semiconductor and telecommunication components where fabrication has been reduced within the U.S. (in some cases by 50%) and the void has

been filled by foreign manufacturers. These types of parts are used in unmanned systems, radios, computers and multiple other military systems.¹⁰

Most of these systems also need batteries of some type and there is concern that the U.S. is becoming progressively more dependent on foreign suppliers for battery components that are used in our warfighter's electronic devices to include radios, computers, night vision goggles and laser range finders, to name a few. In a study sponsored by Rand, the researchers said "most of the batteries procured by the Department of Defense are assembled from critical components manufactured outside the United States, principally in Asia...Unless the U.S. manufacturing base were to become competitive in the much larger market for consumer devices, fully domestically produced batteries for military application will remain expensive compared to those using cells produced in Asia."¹¹

U.S. strategic interests in Central Asia are also of concern, but U.S. has concerns with this area due to the proximity to Russia, Iran and China. Stephen Blank author of the article "U.S. Interests in Central Asia and the Challenges to Them," argued that the future of this region will have a strong bearing on the global war on terrorism and our overall security interests in Eurasia. He indicated that the U.S. is concerned with this region due to its proximity to Russia, Iran and China, and the future of the region will have a strong bearing on the Global war on Terrorism and our overall security interests in Eurasia. Strategic materials, components and energy sources are of concern and the U.S. will need to put in place mitigation efforts to ensure a strategy is in place to have adequate supplies of these for our weapon systems.¹²

In addition to the previously discussed risks, the U.S. has risk concerns relative to space products and technologies. Captain Ronald B. Cole submitted a thesis on Meeting U.S. Defense Needs in Space and he said that "A growing dependence on undependable foreign sources for

raw and exotic materials, increased material and parts costs, ... As a result of the Air Force emphasis on space, the U.S. satellite industry is recognized as one sector of the defense industry base deserving particular attention. It is imperative this industry have the capacity and capability to meet U.S. defense needs for the DOD to successfully control the space environment.”¹³

Our national security depends on access to and use of space now more than ever. It is through space in general, and satellites in particular, that the U.S. military and civilians perform many necessary functions including: communications, environmental and remote sensing, meteorological support, missile defense, navigation, reconnaissance, surveillance, strategic early warning, and tactical warning/assessment.¹⁴ U.S. industry is therefore becoming more and more critical to space exploitation through satellite applications.

In addition to the dangers of losing a technological edge by depending on foreign producers, quality control of these foreign fabricated products is also a growing concern. The U.S. is now faced with the rising problem of counterfeit and defective microchips in both commercial and military products. These quality control concerns become more difficult with the United States’ growing dependence on overseas facilities, defense contractors, and subcontractors for our vital production efforts.¹⁵ Mr. Gross argued that the health of our industrial base is key to mitigating the risks associated with our dependence on foreign produced items. To produce the equipment and provide the needed capabilities in weapon systems to include communications, sensing, meteorological support, navigation, reconnaissance and support, the U.S. must maintain the technological edge which is at risk through our foreign producer dependence.

Raw Material Current Mitigation Efforts

Concern of U.S. dependency on China for rare elements has not fallen on deaf ears as U.S. legislators are working actions to mitigate some of the risk associated with the U.S. dependency on China. These legislators are introducing bills to recommend exploring options for stockpiling, recycling and indigenous production of rare earths.¹⁷

The Under Secretary of Defense for Acquisition, Technology, and Logistics (AT&L) maintains policy oversight for the Strategic and Critical Materials Stockpiling Act (50 U.S.C. 98 et seq.). Lt. Col Butler indicated that public laws are established to identify and oversee strategic materials through the Strategic Materials Protection Board (SMPB). The SMPB has responsibility to identify what the long term strategic material needs are to U.S. national security. After these strategic materials are identified, the SMPB determines if the material is not available in the U.S. and the associated risk with the lack of indigenous rare earths availability.¹⁸

Lt. Col Butler identified methods for mitigating risk associated with non-availability of raw materials through stockpiling, recycling and producing the rare earths within the U.S. He indicated that the SMPB does not develop a list of strategic materials completely subjectively and that stringent definitions and criteria are used.¹⁹ The SMPB developed definitions for the terms strategic and critical with regards to materials to better categorize these materials. Strategic materials were defined as materials that are essential for important defense systems, perform a unique function, and have no viable alternatives.²⁰ Critical materials are defined as materials that are strategic under this definition but also have the following qualifiers: (1) the DOD dominates the market for the material; (2) the DOD must be actively involved in shaping and directing the market, and (3) there is an unacceptable risk of supply disruption due to vulnerable U.S., or qualified non-U.S. suppliers.²¹

SMPB then uses these definitions and criteria to evaluate whether materials are considered strategic, but Congress has confirmed “that specialty metals are essential for important defense systems does not mean that specialty metals are critical materials, nor that national security requires that only U.S. produced specialty metals be used for DOD applications.”²² This seems to add complexity and the SMPB has not recommended stockpiling rare earths to date which begs the question how much risk must exist for Congress to weigh in more heavily before we are late to need and make stockpiling a more relevant course of action.

Currently, there is very little recycling of rare earths due to the high costs of the recycling process coupled with the market price of rare earths. Mr. Thomas Goonan argued that if supply of Chinese rare earths continues to decrease, then recycling may become more economically feasible. The need for the U.S. to develop affordable technologies for recycling has become more useful. Legislative efforts have begun to enable potential recycling programs and funds. The Department of Energy leads the initiative with a primary focus on developing clean energy for vehicles but with a side benefit of reducing U.S. reliance on imported rare earths through recycling.²³ Unfortunately, sound and affordable solutions for recycling that meet EPA standards have yet to be developed.

The third option is to produce the rare earths in the United States. Lt. Col Butler provided historical information that the U.S. was the lead rare earths producer in the 1980s but these efforts were stopped primarily due to issues relative to environmental standards and expense.²⁴ During that era a U.S. mine that was extracting rare minerals was shut down because of the expenses associated with compliance to environmental standards. In recent years the indigenous production of rare earths has gained support. Interest attracted investors in mining and production of rare earths and Molycorp reopened the Mountain Pass Mine. Molycorp began re-

development of the Mountain Pass mine in 2008 with the goal of producing both heavy and light rare earths beginning in 2012.²⁵ Expenses associated with environmental standards contributed to the closing of the Mountain Pass mine and Molycorp announced suspension of production at the Mountain Pass rare earths plant Oct 20, 2015. However, their plants in Estonia and China are in place to continue providing rare earths to their customers and keeping the U.S. foreign dependence growing.²⁶

In light of the U.S. difficulty in finding alternative sources for rare earths, Dr. Scissors argued that, even if China did fail to restrict their supply, the U.S. still must find an alternative source for rare earths in case of crisis. He said that this would not be an easy task and “It will take years to win all regulatory clearances, develop a rare earth mine and build up a processing capacity.”²⁷

As of this date, the U.S. is still faced with reliance on foreign suppliers for these rare earth materials and a solution is yet to be found for this dependence. This illustrates a compelling need to develop affordable technologies to produce rare earths while adhering to environmental standards.

Production Capability Current Mitigation Efforts

In addition to legislation to explore U.S. dependencies on foreign raw materials, Congress has acted to do the same for dependencies on foreign manufacturers. To understand the level of risk the U.S. must assess the level of expenditures; types of products, supplies and services; and to which foreign countries we are dependent for these items. Without this knowledge and information we cannot develop adequate solutions or mitigation strategies.

One such action associated with foreign supplier dependence is Section 812 of the National Defense Authorization Act for Fiscal Year 2004 (Public Law 108-136), as amended by

section 841 of the John Warner National Defense Authorization Act for Fiscal Year 2007 (Public Law 109-364). Under this authorization the Secretary of Defense can start a program to assess the level of dependence on foreign suppliers on an annual basis. This law provides the mechanism for decision makers to assess the capabilities of the U.S. industrial base to meet the production needs for national security under U.S. Code Title 10. Through this law an assessment report is provided to the Committee on Armed Services of the Senate and House of Representatives annually.²⁸ This assessment is based on DOD prime contracts valued at over \$25,000 for defense items and components exclusively. The purpose of these analyses and assessments is to identify and evaluate those industrial and technological capabilities needed to meet current and future defense requirements. Then the results are used “to make informed budget, acquisition, and logistics decisions.”²⁹

The U.S. technological and industrial assessment falls under Title 10 U.S. C., and the primary provisions are defined in sections 2501, 2503, 2504, 2505 and 2506. Section 2501 establishes national security objectives, program status data used in the assessment and the assessed extent of the U.S. dependence on foreign sources of supply. Section 2501 states that it is the policy of Congress that the national technology and industrial base be capable of: supplying and equipping the force structure of the armed forces; sustaining production, maintenance, repair, and logistics for military operations; maintaining advanced research and development activities; reconstituting within a reasonable time the capability to develop and produce supplies and equipment; providing for the development, manufacture, and supply of items and technologies critical to the production and sustainment of advanced military weapon systems; and maintaining critical design skills to ensure that the armed forces are provided with systems capable of ensuring technological superiority over potential adversaries.³⁰

Section 2503 mandates the Secretary of Defense establish a national defense program to provide the analysis of the national technology and industrial base. Section 2504 mandates the annual reporting requirements to the Committee on Armed Services of the Senate and the Committee on National Security of the House of Representatives. Section 2505 provides other analyses used to include identification of each program designed to sustain specific essential technological and industrial capabilities and other selected assessments of the capability of the national technology and industrial base to attain the national security objectives set forth in section 2501. Section 2506 describes the methods and analyses used to identify and address concerns regarding technological and industrial capabilities of the national technology and industrial base.³¹ The statute requires the report include: the total number and value of qualifying contracts awarded by the Department of Defense; the total number and value of such contracts awarded on a sole source basis; the total number and value of contracts awarded to foreign contractors, by country; the total number and value of contracts awarded to foreign contractors through competitive procedures, by country; and itemized list of all Buy American Act waivers granted.

In the assessment of the U.S. reliance on foreign suppliers are the conditions that may constitute unacceptable foreign vulnerabilities as defined in DOD Handbook 5000.60-H, “Assessing Defense Industrial Capabilities.” These unacceptable risk categories include situations where there is a high “market concentration” combined with political or geopolitical vulnerability such as being located in areas of, or vulnerable to serious political instability causing items not to be available when needed politically unfriendly or anti-American foreign countries, countries that are identified as “terrorist countries,” or countries that are subject to sanctions.³² The report lists waivers granted under the Buy American Act and in 2008 these

waivers totaled 18 billion dollars. Therefore, periodic focused assessments are conducted on its supplier base to determine the level non-U.S. suppliers have been reliable suppliers.³³

The Annual Report of United States Defense Industrial Base Capabilities and Acquisitions of Defense Items and Components Outside the United States is the primary tool for our decision makers to maintain information and situational awareness of our risks associated with dependence on foreign suppliers and enable decision makers in determining more sound mitigation strategies. Unfortunately, Dr. Scissors argued that this data is complicated and there is inadequacy in the guidelines.³⁴ The inadequacy in the data is due a number of issues to include the data isn't specific enough to monitor what has become important materials or components, the integrated nature of equipment production obscures the importance of the item in military production, or some finished goods having subtle value or flaws in data that obscure important items in larger categories.

Enabler for production and supply of critical resources

These pieces of legislation identify potential areas of risk but do nothing to actually mitigate those risk areas identified. However, legislation exists to mitigate some of the aforementioned risk. The primary source of authorities to expedite or expand the supply of critical resources from the U.S. industrial base to support the national defense and homeland security is the Defense Production Act (DPA) originally enacted in 1950. In the August 25, 2014 Congressional Research Service Report, *The Defense Production Act of 1950: History, Authorities, and Reauthorization*, the authors describes the DPA purpose is to provide the President a broad set of authorities to ensure that domestic industry can meet national defense requirements. In the DPA, Congress has found that “the security of the United States is dependent on the ability of the domestic industrial base to supply materials and services for the

national defense and to prepare for and respond to military conflicts, natural or man-caused disasters, or acts of terrorism within the United States.”³⁵ Through the DPA, the President can, among other activities, prioritize contracts for goods and services, and offer incentives within the domestic market to enhance the production and supply of critical materials and technologies when necessary for national defense.³⁶ According to the Federal Emergency Management Agency, this includes the programs for national defense, homeland security, “military, energy, space activities, emergency preparedness activities, protection and restoration of critical infrastructure, and efforts to prevent, reduce vulnerability to, minimize damage from, and recover from acts of terrorism within the U.S.”³⁷ The DPA is a Title 50 authority under the jurisdiction of the Banking Committees and DPA is not a permanent authority and must be periodically reauthorized. It was last reauthorized on Sept. 26, 2014 until Sept. 30, 2019.³⁸

Originally the DPA contained seven titles but four titles were repealed in the 1950s leaving the three remaining as follows: Title I Priorities and Allocations; Title III Expansion of Productive Capacity and Supply; and Title VII General Provisions.³⁹ Title I authorizes the President to require that performance on contracts and orders that promote national defense take priority over any other contract, and to allocate materials, services and facilities, when necessary, to promote national defense and to maximize domestic energy supplies.⁴⁰ Title III authorities are intended to help ensure that the nation has an adequate supply of, or the ability to produce, essential materials and goods necessary for the national defense. Title III authorizes the President to use various financial incentives to expand productive capacity and supply for national defense purposes. Provisions in Title III provide for purchases and purchase for installation of government-owned equipment in industrial facilities, and development of substitutes for critical

items and industrial resources.⁴¹ Figure 1 shows a sample set of current Title III programs in AT&L.

Figure 1: Defense Production Act Title III Briefing, 18 Sept 2015.

Defense Production Act Title III Initiatives

Re-established Domestic Beryllium Production Capability

- Critical enabling material for defense applications including: electro-optic systems, missile guidance systems, satellites, missile defense systems, nuclear weapons, nuclear power plants

Li Ion Batteries for Space

- Established domestic manufacturing capacity for advanced lithium ion cells, anodes, cathodes, and precursor materials for national security space systems
- Partnering with domestic providers to expand production capacities
- Significant performance advantages and baseline technology for next-generation satellites

ALON Transparent Armor

- Expanded production of ALON transparent armor
- 1/3 the thickness and 1/3 the weight of glass-based transparent armor
- Improved ballistic protection, performance, and reliability for vehicles equipped with ALON
- Stops 50 cal AP

Reactive Plastic CO2 Absorbent

- Successfully expanded production capability to produce advanced CO2 absorbent technology for human rebreather and submarine safety requirements
- Eliminates granular product form performance and safety issues
- Facilitates new non-military markets – e.g., first responder, mine safety, medical anesthesia

Light-Weight Polymer Ammunition

- Developing a production capability for light-weight polymer-based ammunition
- ~30% lighter than conventional ammunition
- Drop-in replacement for existing systems – no redesign required
- Reduces soldier burden
- Improves battlefield mobility and survivability
- Reduces fuel consumption, improves battlefield logistics
- Supports Lighten-the-Load Initiative

Military Lens Fabrication

- Established a domestic supplier that can provide a cost-effective “end to end” production for mono- and advanced multi-spectral optical surveillance solutions for the warfighter

Gallium Nitride (GaN) Electronics

- Title III portfolio of investments mitigating reliability issues related to manufacturing, in addition to those that drive yield/cost
- Focus on processes applicable to numerous programs rather than on application/system-specific part development
- Enabling fielding of advanced radar and electronic warfare systems supporting Missile Defense Agency, Navy and Air Force

Source: Mr. Mark Buffler, Title III program Director, “Title III of the Defense Production Act,” Defense Production Act Title III Briefing, 18 Sept 2015.

Title VII is a catch all title for provisions not covered in Titles I and III. This title includes a number of DPA “housekeeping” provisions, such as authorization of appropriations, termination of authorities, definitions, and a number of other authorities relating to defense industrial preparedness.⁴²

Within the limitations of funding and guidelines, the DPA is useful for mitigating risks associated with the U.S. dependence on foreign suppliers but it is not a complete solution. First we have a critical need to improve the adequacy of the data to gain a full understanding where

the vital risks lie in the U.S. dependence on foreign producers. Once 'adequate data' is achieved more efforts must be put in place to direct programs and funding to better mitigate our risk of foreign dependence.

Conclusion

Given the U.S. Military's dependence on foreign suppliers for weapon system development, the U.S. is faced with challenges in adequacy of data, funding and laws to further mitigate risks associated with dependence on foreign suppliers. Ultimately the U.S. Military must develop strategies to leverage commercially available technologies or programs to ensure life cycle security and material availability for our U.S. Military weapon systems.

Recommendations provided by Dr. Scissors on what the American government should do address some of the gaps to mitigate risks of foreign supplier dependence. He suggested to first improve information for analysis and assessment of the technological and industrial base. After assessment with better data, the U.S. can then seek alternatives for production items or capability and potentially improving the current practices in stockpiles and criteria.⁴³

Unfortunately Dr. Scissors' recommendations do not solve the burden of funding or possibly legislation in the current austere environment. As evidenced there exist programs to help mitigate the risks associated with dependence on foreign suppliers but the adequacy of these programs are still falling short of complete risk mitigation. Unfortunately these programs are only chipping away at the core of the issues in first understanding what our production risks are and then mitigating them.

As of this date, strategies to ensure adequate stockpiles and indigenous rare earth production in the U.S. have not been finalized and a solution for the potential lack of indigenous production capability for the items at risk has not been determined. We need to investigate

additional risk mitigation strategies to ensure that the welfare, of the nation is secure. As of this date, the U.S. is still faced with reliance on foreign suppliers for these rare earth materials and a solution is yet to be found for this dependence. This illustrates a compelling need to develop affordable technologies to produce rare earths while adhering to environmental standards or an argument to enact exceptions to EPA standards for indigenous production of rare earths to protect our national security.

Solutions strategies need stronger emphasis by decision makers. Laws need to be enacted to enable indigenous production of vital materials, funding and legislation needs to be addressed in a timely fashion to obtain adequate data to minimize impacts of shortages in strategic materials and production shortfalls jeopardizing the U.S. national defense systems and security. Congress could potentially weigh in more heavily before we are late to need to enable more efficient stockpiling, enact exceptions to EPA standards to enable indigenous rare earth production and fund data adequacy programs as relevant courses of actions to address our national security needs.

Notes

¹ Grant Gross, "Study: US Military too Reliant on Foreign-Made Equipment," PC World (May 8, 2013). Accessed on 12 Nov 2015. <http://www.pcworld.com/article/2038218/study-us-military-too-reliant-on-foreignmade-equipment.html>.

² Frank Kendall, "Statement of Honorable Frank Kendall for Acquisition, Technology and Logistics on the Reauthorization of the Defense Production Act before the Committee on Banking, Housing, and Urban Affairs of the United States Senate," (July 16, 2013).

³ James G. Roche, Remarks to the National Security Form, Maxwell Air Force Base Ala., May 30, 2003.

⁴ Ibid.

⁵ Derek Scissors, Ph.D., *Free Markets and National Defense: U.S. Import Dependence on China*, Backgrounder (Published by the Heritage Foundation, No. 2469, September 21, 2010). Accessed on Nov 13, 2015. <http://www.heritage.org/research/reports/2010/09/free-markets-and-national-defense-us-import-dependence-on-china>.

⁶ Valerie Biley Grasso, *Rare Earth Elements in National Defense: Background, Oversight Issues, and Options for Congress*, CRS Report for Congress 7-5700 (Washington D.C.: Congressional Research Service, 8 June 2011), Summary.

⁷ Charles J. Butler, Lieutenant Colonel, USAF, "Rare Earth Elements: China's Monopoly and Implications to U.S. National Security," Air Force Fellows: Air University, A Research Report Submitted to Air Force Fellows In partial Fulfillment of the SDE Graduate Requirement, March 2012.

⁸ George J. Coakley and Philip M. Mobbs, "The Mineral Industries of Africa," *U.S. Geological Survey Minerals Yearbook*, (1999).

⁹ Grant Gross, "Study: US Military too Reliant on Foreign-Made Equipment," PC World (May 8, 2013). Accessed on 12 Nov 2015. <http://www.pcworld.com/article/2038218/study-us-military-too-reliant-on-foreignmade-equipment.html>.

¹⁰ Ibid, 2.

¹¹ Richard Silberglitt, James T. Bartis, and Kyle Brady, "Soldier-Portable Battery Supply," RAND Corporation: Objective Analysis Effective Solutions. Accessed on Nov 13, 2015. http://www.rand.org/pubs/research_reports/RR500.html.

¹² Stephen J. Blank, "US Interests in Central Asia and the Challenges to Them," *Military Technology*; Jan 2007; 31, 1; ProQuest Research Library.

¹³ Ronald B. Cole, B.S. Captain, USAF, "Meeting U.S. Defense Needs in Space: Effects of a Shrinking Defense Industrial Base on the Satellite Industry," Air Force Institute of Technology: Graduate School of Logistics and Acquisition Management, A Thesis Submitted to the Faculty, September 1997.

¹⁴ Mehuron, Tamar A. "Space Almanac," *Air Force Magazine*: 28-43 (August 1996).

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